REMARKS

Claims 1-20 are pending in the application.

The Examiner rejected claims 1-20 under 35 USC 103(a) on the combination of Stokes U.S. Patent No. 6,791,259 and Itoh U.S. Patent No. 6,337,035.

Applicants have amended claims 1-9, 11 and 13-19. No new matter has been added.

Stokes patent is directed to a white light illumination system, and specifically to a solid state lamp containing a semiconductor light emitting diode (LED) or laser diode, a light scattering material and a luminescent phosphor or dye material. Stokes discloses a solid state lamp 41 as shown in Fig. 5 that solves a problem inherent with a conventional lamp (primary light by blue LED or blue laser, and secondary light by light-emitting material such as phosphor) shown in Fig. 3 or Fig. 4 by using a radiation scattering plate. The solid state lamp 41 is composed of a radiation source 43 (LED or laser) for emitting blue or UV primary light, a light scattering material 46 for receiving the primary light and scattering the primary light uniformly, and a luminescent material 45 (phosphor or organic dye) for emitting the secondary light upon reception of the scattered light (Fig. 5, Col. 4 lines 16-35). Stokes also discloses the feature where the phosphor may have a mean (d50) particle size of 1 to 25 microns (1 – 15,625 μm^3 when converted to volume), preferably 5 – 10 microns (125 – 1,000 μm^3 when converted to volume) (Col. 6, lines 6-19).

Itoh discloses a particle of phosphor made of a compound of a III-V group semiconductor deposited by hetero-epitaxial growth in the form of fine particles or a thin film on a surface of a carrier particle that acts as a nucleus or core of the phosphor. The carrier particle is made of AlN or Al_2O_3. The carrier particle has a particle diameter of 0.01 – 2 μm (10 – 2,000 nm, or 1,000 nm^3 – 8 μm^3 when converted to volume) (Col. 2, line 66 – Col. 3, line 12).

With respect to claim 1, Stokes discloses a solid state lamp 41 that is composed of a radiation source 43 for emitting primary light, a light scattering material 46 for scattering the

primary light uniformly, and a luminescent material 45 for emitting the secondary light upon reception of the scattered primary light (Fig. 5, Col. 4, lines 16-35). By contract, amended claim 1 recites that the light-emitting apparatus of the claimed invention comprises "a light source that emits primary light; a phosphor formed as fine-particle crystals of a III-V group compound semiconductor, the fine-particle crystals being nano-crystals each having a volume of 2800 nm^3 or less; and a phosphorescent portion formed by combining the phosphor with a transparent member, wherein the phosphorescent portion receives the primary light emitted from the light source directly with the primary light unscattered in an optical path therebetween so that the phosphor absorbs at least part of the primary light and emits secondary light having a longer peak wavelength that the primary light." Although Stokes requires the radiation scattering plate 46 to solve a problem inherent with a conventional lamp, as explained above, the claimed invention does not require such a radiation scattering plate. Similar logic also applies to claim 11.

Also in claim 1, the phosphor of the claimed invention is formed as fine-particle crystals of a III-V group compound semiconductor, and the fine-particle crystals are nano-crystals, each having a volume of 2800 nm^3 or less. Similarly, in claim 11, the fine-particle crystals are nano-crystals, each measuring 14 nm or less in two directions perpendicular to a longest side thereof. Itoh, by contrast, discloses a particle of phosphor made of a compound of a III-V group semiconductor deposited by hetero-epitaxial growth in the form of fine particles or a thin film on a surface of a carrier particle that acts as a nucleus or core of the phosphor. Although Itoh discloses that the diameter of the carrier particle is 0.01 – 2 μm (10 – 2,000 nm, or 1,000 nm^3 – 8 μm^3 when converted to volume) (Col. 2,line 66 – Col. 3, line 12), Itoh does not disclose the diameter of the fine-particle crystals of the III-V group compound semiconductor which, per se, is the phosphor formed by hetero-epitaxial growth. Itoh does not disclose that the fine-particle

crystals are "nano-crystals" as in the present invention describes. Similar logic also applies to claim 11. Thus, claims 1 and 11 are patentable over the cited references.

While the remaining pending claims depend directly from either claim 1 or 11, and are thus patentable for the reasons described above, applicants wish to point out other differences between the claimed invention and the cited references.

With respect to amended claims 3 and 13, Itoh discloses that the luminous colors are varied by continuously changing the energy gap depending on a ratio between Ga and In (Col. 5 lines 56-64). By contrast, the claimed invention defines that the phosphorescent portion has a multilayer structure in which a volume distribution of the nano-crystals varies from an entrance side to an exit side of the primary light, and the phosphorescent portion emits the secondary light having a wavelength distribution corresponding to the volume distribution. Support for this is found in paragraph [0065] of the specification and is made clear in the amended claims.

In claims 4 and 14, although Itoh discloses that the III-V group compound semiconductor is a nitride semiconductor, Itoh does not disclose that the fine-particle crystals thereof are nano-crystals each composed of a single portion having a uniform energy band gap.

Regarding claims 5and 15, although Itoh discloses that the III-V group compound semiconductor is a nitride semiconductor, Itoh does not disclose that the fine-particle crystals thereof are nano-crystals each composed of a first portion and a second portion that encloses the first portion and that has a greater energy band gap than the first portion.

With respect to claims 6 and 16, although Stokes discloses that the glass is used as a medium for a radiation scattering material 46, Stokes does not disclose that the nano-crystals of the phosphor are dispersed in glass. Moreover, the particle size that Stokes discloses is 70 to 1800 times larger than the particles disclosed by the applicants.

In claims 7 and 17, although Stokes discloses that the plastic or resin is used as a medium for a radiation scattering material 46, Stokes does not disclose that the nano-crystals of the phosphor are dispersed in resin.

Regarding claims 9 and 19, the Action states that the filter of the claimed invention (arranged in an optical path of the secondary light emitted from the phosphor for cutting off the primary light emitted from the light source) reads on the passivation layer 56 of Stokes. Applicants have amended claims 9 and 19 to define a filter, arranged opposite to a side of the phosphorescent portion to which the primary light enters and in an optical path of the secondary light emitted from the phosphor that cuts off only the primary light that passes through the phosphorescent portion. This amendment makes clear that the filter of the present invention is arranged and functions in a different way than the passivation layer of Stokes.

To summarize: in view of the amended claims and arguments above, the invention claimed is patentable over the prior art, and claims 1 and 11 should be allowed. This logic also disposes of claims 2-10 and 12-20, which depend directly from claims 1 or 11.

In view of the above, each of the claims in this application is in condition for allowance. Accordingly, applicants solicit early action in the form of a Notice of Allowance.

In the event that the transmittal letter is separated from this document and the Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing Docket No. 524242000700.

Respectfully submitted,

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